DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

GEOTHERMAL TRAINING AND RESEARCH INSTITUTE

MSc GEOTHERMAL ENERGY

FIRST YEAR - SECOND SEMESTER 2020/2021

EIE 4120: RESEARCH METHODOLOGY

DATE: **TIME: 3 Hours**

<u>INSTRUCTIONS</u>

1) TIME ALLOCATED – 3 hours.
2) There are five questions in this paper.
3) Attempt Question 1 and any other two questions
4) Question 1 is graded out of 30 marks while the other two questions carry equal marks of 20 each

Question 1: - [30 marks] – This question is compulsory

a) Which sections of a thesis presents the information on whether the objectives of the research have been made? What else should the section have? *[5 marks]*

b) Rearrange the following citation to conform to the APA format: *Renewable and Sustainable Energy Reviews*, *50*, 372-407 (2015). Shortall, Ruth., Davidsdottir, B., & Axelsson, G. A sustainability assessment framework for geothermal energy projects: Development in Iceland, New Zealand and Kenya. (**5 marks**)

c) What is the difference between the introduction chapters of a proposal and the thesis? (**5 marks**)

d) When you read an academic text, you are expected to do much more than simply understand the words of the text and summarize main ideas. What are **five** things as a reader you are expected to do when reading? (**10 marks**)

e) Give five crucial information that should be put in the methodology chapter in the thesis? (**5 marks**)

Question 2: - [20 marks]

Write notes on what the introduction section of a thesis/research paper contains?

Question 3: - [20 marks]

Explain what extraneous or confounding variable are in research, how do they come about and ways to avoid them?

Question 4: - [20 marks]

Kindly read the appended Abstract and attempt the questions that follow.

Geologic mapping is an effective and reliable methodology for both geothermal and mineral resources exploration, assessment and development. In most cases, geothermal exploration starts with geology and surface manifestations mapping followed by geochemical and geophysical resistivity surveys. It is anticipated that, when surface exploration phase is successfully completed, the nature, size and reservoir conditions should be certain and evidently outlined for test drilling. However, various geothermal fields belong to different tectonic settings and tend to depict unlike characteristics when the same techniques are deployed. As a result, several additional exploration works emerge for infill data collection to resolve underlying uncertainties prior exploratory drilling. For example, in Tanzania, detailed surface studies have been completed in both Luhoi and Songwe geothermal prospects. The two prospects are categorically described as low-medium temperature, fault controlled geothermal systems that could significantly be exploited for both electricity generation and direct utilization projects. For better understanding and characterization of temperature profiles and/or reservoir conditions of these kind of systems, it is deemed necessary to drill shallow temperature gradient holes ranging from 100 to 150 m depth. This approach is cost effective and provide additional and useful subsurface insights (geology and temperature profiles) enough to further develop potential prospects and help to mitigate risks that would have been associated with deep drilling. Therefore, this paper presents the significance of surface geology and shallow temperature gradient drilling as a means of understating the subsurface conditions for low-medium geothermal prospects, which exhibit uncertainties before embarking on slim and deep wells.

a) Propose a title for this Abstract [**5 marks**]

b) What is the problem this research is trying to solve? [**5 marks**]

c) What is the methodology for this investigation? [**5 marks**]

d) What are the justifications for doing this research? [**5 marks**]

Question 5 - [20 marks]

Kindly read the appended Abstract and attempt the questions that follow.

DELINEATION OF GOLD MINERAL POTENTIAL ZONE USING HIGH RESOLUTION AEROMAGNETIC DATA OVER PART OF KANO STATE, NIGERIA

The study of the geometry and kinematics of deep geological structures, bearing mineralization has advanced greatly by the aggressive progress of geophysical techniques over the last decades. The mineralization zones located in the Shanono local government area of Kano state Nigeria has its genesis controlled by shear zones. This research was aimed at delineating and characterizing subsurface geologic structures around the study area. Both qualitative and quantitative analysis of aeromagnetic data has provided defined distinct pattern of the magnetic signatures. Euler solution of the aeromagnetic data with structural index one, revealed the presence of the major tectonic trends of anomalies in the NE-SW and NW-SE directions. The trends of few of these structures are observed to be similar to fracture orientations in the Nigerian basement complex. These structures control the emplacement of the gold mineralization as these provides the pathways to flow of mineral rich fluid within the host rocks of the study area.

a) Offer THREE possible research questions for this study [**5 marks**]

b) What conclusions / inferences are drawn from this study? [**10 marks**]

c) What are the findings and inferences from the data of this research? [**5 marks**]